

EFFECTS OF IMMEDIATE AND DELAYED ERROR CORRECTION ON THE ACQUISITION AND MAINTENANCE OF SIGHT WORDS BY STUDENTS WITH DEVELOPMENTAL DISABILITIES

Patricia M. Barbetta, William L. Heward, Donna M. Bradley, and April D. Miller
Florida International University, The Ohio State University,
Hamilton Local School District, and University of Southern Mississippi

We compared immediate and delayed error correction during sight-word instruction with 5 students with developmental disabilities. Whole-word error correction immediately followed each error for words in the immediate condition. In the delayed condition, whole-word error correction was provided at the end of each session's three practice rounds. Immediate error correction was superior on each of the four dependent variables.

DESCRIPTORS: developmentally disabled children, error correction, feedback, instructional design, reading, developmentally disabled children

The present study is an extension of two previous experiments that analyzed the characteristics of effective error correction during sight-word instruction with students with developmental disabilities. In the first study, whole-word error correction (the teacher stated the whole word and the student repeated it) provided after each sight-word reading error was more effective than phonetic-prompt error correction (the teacher provided phonetic prompts) for all 5 students (Barbetta, Heward, & Bradley, 1993). In the second study, whole-word error correction was implemented with and without the student repeating the correct response during each error-correction episode (Barbetta, Heron, & Heward, 1993). All 6 students in that study acquired and maintained words at a higher rate when each error-correction episode ended with the student making an active response, compared to the no-response procedure in which the students "paid attention" as the teacher modeled the correct response. The present study investigated the extent to which the acquisition and maintenance of sight words are influenced by the timing of whole-word error correction with an active student response: immediately following each error on a trial-by-trial basis versus delayed until the end of the session on a massed practice basis.

METHOD: Participants. Participants were 1 male and 3 female students, aged 7 to 9 years, enrolled in a self-contained class for students with developmental disabilities. Full-scale IQ scores ranged from 58 to 77. Student 1 read at the first-grade level; the others read at preprimer to primer levels. Student 4's participation was shortened due to a family move.

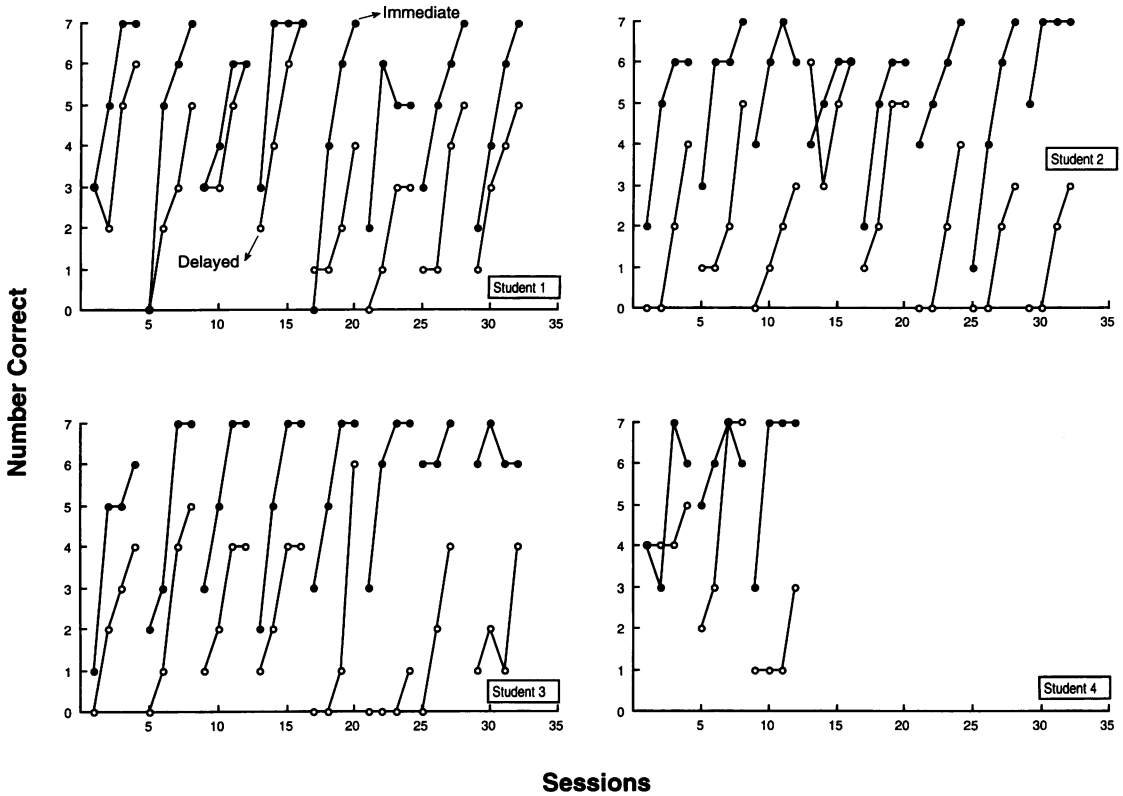
Procedure. Individualized pretesting was conducted each week to create a new set of 14 unknown words (printed on 3 in. by 5 in. index cards and randomly assigned to immediate or delayed error correction). One-to-one instructional sessions on each word set were conducted 4 days per week. Each 10- to 12-min session consisted of (a) a teacher presentation of words (on the 1st day of instruction per set) or a next-day test, (b) three practice trial rounds with error correction (with words shuffled between rounds), and (c) a same-day test approximately 3 hr after instruction (for details, see Barbetta, Heward, & Bradley, 1993).

During immediate error correction, immediately following each error, the teacher said, "No, this word is _____. What word?" The student repeated the word, and the teacher provided praise and presented the next word. During delayed error correction, immediately following each error the teacher said, "No, we'll try this word later" and then presented the next word. After all three practice rounds were completed, the teacher collected and shuffled all delayed word cards on which the student erred, presented one of these word cards, and said, "This word is _____. What word?" The student repeated the word and the teacher provided praise. This error-correction procedure was then repeated, if necessary, one or two more times to equal the number of errors committed by the student on that word during the practice trials. All of the error corrections for a particular word were completed before the next word card was presented.

Experimental design and dependent measures. An alternating treatments design was used to compare the effects of the two error-correction procedures on the percentage of words read correctly during instruction, the number of words read correctly on same- and next-day tests, and the percentage of learned words read correctly on 1- and 2-week maintenance tests. Definitions of these variables can be found in Barbetta, Heward, and Bradley (1993).

Interobserver agreement and treatment integrity. A second observer independently recorded each student's performance on approximately one third of all sessions. Word-by-word comparisons of observer records yielded mean overall agreement scores of 99.5% for same-day tests, 99.8% for next-day tests, and 100% for practice trials and maintenance tests. Of the 1,722 practice trials in which treatment integrity data were collected, the teacher correctly provided immediate error correction 100% of the time and delayed error correction 98.8% of the time.

RESULTS AND DISCUSSION: Immediate error correction produced better performances than did delayed error correction on all dependent variables by all students. Practice trial data show 44% more correct responses with immediate error correction than with delayed error correction (range, 28% to 53% more). Immediate error correction produced higher same-day test scores on 95 of 107 tests (89%) (see the figure) and higher scores on 70 of 81 (87%) next-day tests. All 4 students maintained more immediate ($M = 85\%$; range, 75% to 88%) than delayed error-correction words ($M = 67\%$; range, 53% to 80%) on 1-week maintenance tests, and on 2-week maintenance tests (immediate: 83%, range, 67% to 81% vs. delayed: 51%, range, 47% to 60%).



A possible reason for the superior effects of immediate error correction is that it produced a higher number of correct responses during instruction than did delayed error correction. Second, delayed error correction resulted in students repeating errors more often during instruction—perhaps one of most debilitating outcomes of delayed feedback. Third, delayed error correction provided massed practice (i.e., two or more repeated trials on the same word) of words missed more than once during instruction. Evidence suggests that skills taught with distributed practice (i.e., practice trials separated by at least one other trial or unit of instruction) are learned better than those taught with massed practice (e.g., Neef, Iwata, & Page, 1980). Fourth, during massed-practice error correction, students may have imitated the teacher's model without looking closely at the printed word (particularly during the second and third correction of the same word), thereby decreasing the probability of transfer of stimulus control from the teacher's verbal models to the target stimuli, the word cards.

The combined results of this study and the two previous studies (Barbetta, Heron, & Heward, 1993; Barbetta, Heward, & Bradley, 1993) provide additional support for error correction that is direct, immediate, and ends with the student actively emitting the correct response. Future research should assess the impact of this type of error correction within a more complete instructional context.

REFERENCES

- Barbetta, P. M., Heron, T. E., & Heward, W. L. (1993). Effects of active student response during error correction on the acquisition, maintenance, and generalization of sight words by students with developmental disabilities. *Journal of Applied Behavior Analysis*, 26, 111–119.
- Barbetta, P. M., Heward, W. L., & Bradley, D. M. (1993). Relative effects of direct and indirect corrective feedback on the acquisition and maintenance of sight words by students with developmental disabilities. *Journal of Applied Behavior Analysis*, 26, 99–110.
- Neef, N. A., Iwata, B. A., & Page, T. J. (1980). The effects of interspersal training versus high-density reinforcement on spelling acquisition and retention. *Journal of Applied Behavior Analysis*, 13, 153–158.

Address correspondence and reprint requests to Patricia M. Barbetta, Florida International University, University Park Campus, DM 202, Miami, Florida 33199. Received February 11, 1993; final acceptance October 22, 1993; Action Editor, Robert Horner.